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from *A. pastoralis* and *A. flexicaulis* are alike in infecting capacity, except that conidia from the former will only partially infect *A. pubescens*, and not *A. alpigena* at all; while conidia from *A. flexicaulis* partially infect *A. alpigena*, *A. pubescens* being entirely immune. Another case is that of the mildew on *A. impexa* which does not infect *A. alpina vera* or *A. nitida*, while conidia from *A. pastoralis* partially infect these hosts. Otherwise the two mildews are alike. STEINER further found that conidia from species of the *Vulgares* group will not produce full infection on alpine species, although conidia from alpine species produce full infection on the *Vulgares* species. STEINER supposes that the mildew on the alpine species came originally from *Vulgares* species and is only partially adapted to the new hosts. He also believes that the appearance of the mildew on alpine species is due to unfavorable environment.

STEINER also claims to have found "bridging species;" for example, conidia from *A. nitida* infect *A. impexa* but not *A. jallax*, while conidia from *A. impexa* will infect *A. jallax*. Thus the mildew is carried over from *A. nitida* to *A. jallax* through *A. impexa*. Similarly, *A. pastoralis* and *A. impexa* transfer the mildew from *A. connivens* and *A. pubescens* to *A. micans*. In addition to the fact that only a few tests were made, STEINER does not tell us what are the infecting powers of the mildews produced in this way on *A. micans* and *A. jallax*.

His conclusions would be more convincing if based on a larger number of tests. A large number of foreign infections also occurred in his experiments, no less than 71 foreign infections occurring in a total of 380 tests. The results are presented very clearly by means of a series of well-devised diagrams.—GEORGE M. REED.

**Cytology of Florideae.**—Cytological studies on the Florideae have been comparatively rare, partly on account of the difficulty in securing material, but principally on account of the difficult technic. Quite recently KURSSANOW has published<sup>5</sup> the results of his studies on three different forms of red algae: *Helminthora divaricata*, *Nemalion lubricum*, and *Helminthocladia purpurea*. His investigations did not deal with nuclear details, but rather with the morphology of fertilization of the carpogonium, the development of carpospores, and the structure of the chromatophores.

He failed to find a nucleus in the trichogyne of *Nemalion* and *Helminthora*; the trichogyne in these forms seems to be an extension of the carpogonium. He believes that such a condition is found only in the simplest forms of red algae, and agrees with the reviewer that a trichogyne with a nucleus, and yet without a partition wall between it and a carpogonium, as in *Polysiphonia*, may be a forerunner of the multicellular trichogyne found in the Laboulbeniaceae. The spermatium (sperm) has a single nucleus, agreeing with the reviewer's description of *Polysiphonia*. He thinks that a uninuclear condition in the sperm may perhaps be universal in red algae. In *Nemalion*, contrary to WOLFE's results, the chromatophore has, in its center, a well-formed pyrenoid which is composed

<sup>5</sup> KURSSANOW, L., Beiträge zur Cytologie der Florideen. *Flora* 99:311-336. pls. 2, 3. 1909.

of two parts, a central portion and the surrounding zone. The pyrenoid is influenced by its environment, and easily becomes swollen and dissolved, leaving vacuoles in its place. Such a compound structure of the pyrenoid is shown only in the stained preparation, and when it is not differentiated with stains the pyrenoid appears quite homogeneous. SCHMITZ's description of the pyrenoid as a homogeneous body may perhaps be based upon the unstained material.—SHIGÉO YAMANOUCHI.

**Karyokinesis in Oedogonium.**—Since STRASBURGER's and KLEBAHN's work on Oedogonium, there had been little published on mitosis in this form until WISSELINGH's paper appeared. STRASBURGER's material was *O. tumidulum* Kg., KLEBAHN's *O. Boscii* Witte, and WISSELINGH's material was *O. cyathigerum* Witte,<sup>6</sup> fixed in Flemming's solution. After being left in the solution for one day, it was treated with 20 per cent. chromic acid. By the action of the Flemming solution and the chromic acid solution, the cell wall and cell contents become entirely dissolved, and the nuclear membrane is also dissolved by the action of 20 per cent. chromic acid solution. The chromosomes during mitosis were studied in their isolated condition.

The chief points of interest are as follows: The mitosis in Oedogonium agrees with that of higher plants; the development of chromosomes out of the nuclear network, the formation of the nuclear plate, the longitudinal splitting of the chromosomes, the reconstruction of daughter nuclei seem like these processes in *Fritillaria* and *Leucojum*, two forms which were also studied by VON WISSELINGH. In Oedogonium, the chromosomes, 19 in number, and differing greatly from one another in length, are connected by fine fibrils. The nucleolus does not take part in forming chromosomes, but disappears at the beginning of mitosis, and there appear in daughter nuclei new nucleoli, which later unite into one.—SHIGÉO YAMANOUCHI.

**Mycorrhiza.**—PEKLO announces in a preliminary paper<sup>7</sup> the results of his studies on the epiphytic mycorrhiza of *Carpinus* and *Fagus*, with brief reference also to the endophytes of *Alnus glutinosa* and *Myrica Gale*.

In *Carpinus*, as a reaction to the penetration of the tissues of the young rootlet, tannins increase (as the author has also determined for *Monotropa*<sup>8</sup>), and this restricts the fungus to the intercellular spaces. Nourishing itself partly on this glucoside and other foods in the cortex, the fungus forms the jacket, the outermost hyphae of which often die. Isolation of the fungus was finally accomplished by using a decoction of old thick mycorrhizas, which proved very specific for the

<sup>6</sup> WISSELINGH, C. VON, Ueber die Karyokinese bei Oedogonium. Beih. Bot. Centralbl. 23:139-156. pl. 7. 1908.

<sup>7</sup> PEKLO, J., Beiträge zur Lösung des Mycorrhiza-Problems. Ber. Deutsch. Bot. Gesells. 27:239-247. 1909.

<sup>8</sup> ———, Die epiphytischen Mykorrhizen nach neuen Untersuchungen. I. *Monotropa Hypopitys* L. Bull. Böhm. Akad. Wiss. 00:000. 1908.